



UNITED STATES DEPARTMENT OF COMMERCE
Pat nt and Trad mark Office

Addr ss: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

T.D

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/162,992 09/30/98 SENOO

T P98-1703

026263 IM52/0213
SONNENSCHN NATH & ROSENTHAL
P.O. BOX 061080
WACKER DRIVE STATION
CHICAGO IL 60606-1080

EXAMINER

WEINER, L

ART UNIT

PAPER NUMBER

1745

DATE MAILED:

02/13/01

14

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/162,992

Applicant(s)

SENOO ET AL.

Examiner

Laura S Weiner

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2000 and 22 December 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-9 and 11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-9 and 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

Art Unit: 1745

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 12-22-00 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/162,992 is acceptable and a CPA has been established. An action on the CPA follows.

Response to Amendment

2. Examiner acknowledges the cancellation of claim 10 cited in Amendment B dated 11-30-00. Examiner acknowledges the cancellation of claim 1 and the addition of claim 11 cited in Amendment A filed 5-26-00. Claims 2-9, 11 have been examined on their merits.

Response to Arguments

3. Applicant's arguments with respect to claims 11, 2-9 have been considered but are moot in view of the new ground(s) of rejection. The claims are now limited to a range of 0.1-3.2 m²/g but Ozaki et al. teaches that the specific surface area ranges from 3.2 m²/g to 3.4 m²/g, therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a specific surface area that was less than 3.2 m²/g, since it has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Art Unit: 1745

Claim Rejections - 35 USC § 112

4. Claims 11, 2-9 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 11 is rejected because there is no support for the range from “0.1 to less than 3.2 m2/g” found on pages 7-8. There was support found for the ranges “0.1 to less than 10 m2/g” and “0.1 to less than 5 m2/g”.

Claim Rejections - 35 USC § 103

5. Claims 11, 2-5, 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akashi (EP 0 724 305 A1) in view of Ozaki et al. (5,522,127).

Akashi teaches on page 3, lines 23-37, a gel electrolyte which has a polymer having a side chain to which at least one nitrile group is bonded and a cell produced by using such a fire-retardant gel electrolyte. Akashi teaches on page 5, lines 29-35, a fire-retardant gel electrolyte was prepared using polyacrylonitrile, ethylene carbonate and propylene carbonate weighed respectively in such amounts represented by Tables 1 and 2 and then added a LiPF6 solution having a molar concentration of 1.0 M. Akashi teaches on page 5, lines 12-16, that suitable negative electrode materials may include a carbonaceous material such as graphite, etc. Akashi

Art Unit: 1745

teaches on page 5, lines 8-11, that the positive electrode may include a lithium/transition metal composite oxide.

Akashi teaches the claimed invention except does not teach that the negative electrode comprises a plurality of meso-carbon micro beads and does not specifically teach that the specific surface area of the carbonaceous material is 0.1 to 3.2 m²/g.

Ozaki et al. teaches in column 3, lines 26-67 and line 4, lines 5-14, that fabrication of the negative electrode plate which by using the mesophase graphite particles obtained by the processes described which was carbonized at 1000 degrees C and further graphitized at 2800 degrees C was mixed with styrene butadiene rubber. Ozaki et al. teaches that the specific surface area ranges from 3.2 m²/g to 3.4 m²/g. Ozaki et al. teaches in column 3, lines 8-14, that the negative electrode formed by carbonizing, and graphitizing leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

It would have been obvious to one of ordinary skill in the art to make the graphitized carbonaceous material by the process taught by Ozaki et al. and obtain the claimed specific surface area of the carbonaceous material of 3.2 m²/g to 3.4 m²/g because Ozaki et al. teaches that this leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a specific surface area that was less than 3.2 m²/g, since it has been held that

Art Unit: 1745

where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

6. Claims 11, 5-6, 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (EP 0 845 824 A1) in view of Ozaki et al. (5,522,127).

Nakane et al. teaches in column 6, lines 11-27, an anode of the lithium secondary battery includes carbonaceous materials such as natural graphite, artificial graphite, cokes, carbon black, etc. Nakane et al. teaches in column 5, lines 28-34, that the cathode includes lithiated nickel dioxide containing aluminum. Nakane et al. teaches in column 8, lines 19-21, that also usable is a so-called gel-type electrolyte in which a nonaqueous liquid electrolyte is maintained by a polymer. Nakane et al. teaches in column 7, lines 30-59, that organic solvents usable include carbonates such as propylene carbonate, ethylene carbonate, dimethyl carbonate, ethyl methyl carbonate, etc.; esters such as gamma-butyrolactone, etc. Normally, two or more compounds of the above are used in combination. Above all, a mixed solvent containing a carbonate is preferred and more preferred is a mixed solvent of a cyclic carbonate and a non-cyclic carbonate. Nakane et al. teaches in column 7, lines 20-29, that it is preferred to use at least one of the salts containing fluorine or at least one salt selected from a group consisting of LiPF₆, LiBF₄, LiCF₃SO₃, etc. Nakane et al. teaches in column 9, lines 25-27, that the mixed solution LiPF₆ was dissolved in a concentration of 1 mol/l of the mixed solvent.

Art Unit: 1745

Nakane et al. teaches the claimed invention except does not teach that the negative electrode comprises a plurality of meso-carbon micro beads and does not specifically teach that the specific surface area of the carbonaceous material is 0.1 to 3.2 m²/g; does not teach that the specific surface area of the carbonaceous material is 0.1 to 3.2 m²/g and does not teach that the propylene carbonate has a proportion of 10-75 mol%.

Ozaki et al. teaches in column 3, lines 26-67 and line 4, lines 5-14, that fabrication of the negative electrode plate which by using the mesophase graphite particles obtained by the processes described which was carbonized at 1000 degrees C and further graphitized at 2800 degrees C was mixed with styrene butadiene rubber. Ozaki et al. teaches that the specific surface area ranges from 3.2 m²/g to 3.4 m²/g. Ozaki et al. teaches in column 3, lines 8-14, that the negative electrode formed by carbonizing, and graphitizing leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

It would have been obvious to one of ordinary skill in the art to make the graphitized carbonaceous material by the process taught by Ozaki et al. and obtain the claimed specific surface area of the carbonaceous material of 3.2 m²/g to 3.4 m²/g because Ozaki et al. teaches that this leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a specific surface area that was less than 3.2 m²/g or use between 10-75 mol% of propylene carbonate, since it has been held that where general conditions of a claim are

Art Unit: 1745

disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

7. Claims 2-4, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (EP 0 845 824 A1) in view of Ozaki et al. (5,522,127) and further in view of Chua et al. (5,240,790) or Abraham et al. (5,219,679).

Nakane et al. teaches the claimed invention as taught above teaching having a gelled electrolyte but does not teach that the gel electrolyte includes a high-molecular material having a nitrile group in its side chain in which the material is polyacrylonitrile.

Chua et al. teaches a secondary electrochemical cell which includes a solid gelled electrolyte system including an amount of polyacrylonitrile, an amount of solvent and plasticizer that includes gamma-butyrolactone. Chua et al. teaches in column 1, lines 10-16 and column 2, lines 10-55, that utilizing a solid gelled film polymeric electrolyte including polyacrylonitrile in combination with one or more solvent plasticizers together with one or more lithium salts offers operational safety, in addition to high energy density and excellent packaging flexibility. The present invention offers higher conductivity and improved layer interfacial stability. Chua et al. teaches that 12-22 mol% of polyacrylonitrile, 18-36 mol% of gamma-butyrolactone and 33-39 mol% of ethylene carbonate was used.

Abraham et al. teaches in column 2, lines 1-20, that polymer electrolytes having conductivities greater than 10^{-3} /ohm - cm can be formed between a low lattice energy Li salt such

Art Unit: 1745

as LiBF₄, etc and a high dielectric constant aprotic organic solvent mixture of propylene carbonate and ethylene carbonate in a polymer matrix such as polyacrylonitrile.

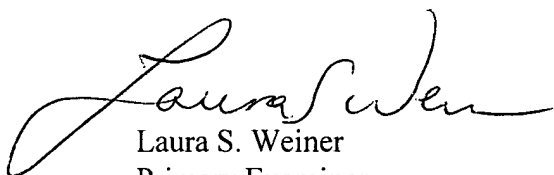
It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the gelled film polymeric electrolyte taught by Chua et al. because Chua et al. teaches that a solid gelled film polymeric electrolyte including polyacrylonitrile in combination with one or more solvent plasticizers together with one or more lithium salts offers higher conductivity and improved layer interfacial stability and because one of ordinary skill in the art knows that the difference between being considered just a solid polymer electrolyte versus a gelled polymer electrolyte is the polymer used.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the electrolyte taught by Abraham et al. because Abraham et al. teaches that polymer electrolytes having conductivities greater than 10^{-3} /ohm - cm can be formed between a low lattice energy Li salt such as LiBF₄, etc and a high dielectric constant aprotic organic solvent mixture of propylene carbonate and ethylene carbonate in a polymer matrix such as polyacrylonitrile and because one of ordinary skill in the art knows that the difference between being considered just a solid polymer electrolyte versus a gelled polymer electrolyte in the polymer used.

Art Unit: 1745

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura Weiner whose telephone number is (703) 308-4396. The examiner can normally be reached on Monday-Friday from 7:30 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gabrielle Brouillette, can be reached at (703) 308-0756. The official fax phone number for the organization where this application or proceeding is assigned is (703) 305-3599.

A handwritten signature in cursive script, appearing to read "Laura S. Weiner".

Laura S. Weiner
Primary Examiner
Art Unit 1745
February 6, 2001